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Patterns of polypharmacy before diagnosis of dementia: A data-driven, retrospective, population-based study with primary care electronic health records

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Background: Polypharmacy presents a serious and significant public health challenge as average lifespans increase. The objective of this study is to identify patterns of polypharmacy before dementia diagnosis, their prevalence and possible complications.

Methods: We identified 33,451 dementia patients from more than 42 million rows of health records in Wales using the GP dataset from 1990 to 2015, via the Secure Anonymised Information Linkage Databank. Cohort selection utilised Read codes to identify any dementia diagnosis within the dataset. No age restriction was applied but complete data for each patient was required. Analysis was stratified by gender and age, but not dementia type. Medications were identified by Read codes, and split into four 5-year sub-periods. Factor analysis was used for patients taking at least 3 medicines in each period.

Findings: 65.8% of the cohort were female with mean age at dementia diagnosis 72.75 years. Sub-period 1 (0-5 years pre-diagnosis) presented 3 clusters. The first cluster, medicines for urinary / respiratory infections, arthritis / rheumatism and heart disease covered 66.55% of patients; second cluster, medicines for urinary /respiratory infections, arthritis / rheumatism, heart disease and depression covered 22.02% of patients; third cluster, medicines for osteoarthritis covered 2.6% of patients. In contrast, five patterns emerged for sub-period 4 (15-20 years pre-diagnosis). First cluster: medicines for infections, arthropathy, cardiovascular-disease (CVD); second cluster: medicines for anxiety, acute-respiratory-infection (ARI); third cluster: medicines for ARI, CVD; fourth cluster: medicines for dermatologic disease; fifth cluster: medicines for asthma, other ARIs, covering from 0.05% (the fifth cluster) to 5.5% (the first cluster) of patients. 71.42% of patients took medications for arthritis, heart disease and infections, with or without medications for mental health.

Interpretation: The further from dementia diagnosis, the greater the number of clusters are observed with lower prevalence of each cluster. In similar patients, understanding interactions and complications occurring from these patterns, by adding medications for dementia, is fundamental. These patterns may inform "safe-prescribing" practice before diagnosis in selecting low anticholinergic burden medicines to minimise their effect on cognitive impairments. Further analysis of these types of polypharmacy among people without dementia will be conducted in the future.

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